
Carrier Remote IPE maintenance

This section describes system maintenance tools and procedures to guide you in identifying Carrier Remote IPE faults, locating defective equipment, correcting problems by fixing or replacing defective equipment, and verifying the operation of Carrier Remote IPE after corrections or replacements have been made.

Maintenance overview

Carrier Remote IPE maintenance deals with two types of problems:

- installation
- operation

Installation problems are created during the installation of an entire Meridian 1 with the Carrier Remote IPE or during the addition of the Carrier Remote IPE to an existing system.

Operation problems occur when components fail or equipment is accidentally disconnected during normal system operation.

In either case, the problem identification should be approached systematically. A problem may have more than one cause. To isolate the cause, a knowledge of Carrier Remote IPE operation is required. This information can be found in the [“Carrier Remote IPE product description” on page 3](#). Once the cause is identified, the problem can be corrected by replacing the defective card, connecting accidentally disconnected cables, or correcting the software problem.

The system provides built-in self-diagnostic indicators and software and hardware tools. These diagnostic facilities simplify system troubleshooting and reduce mean-time-to-repair (MTTR).

This document focuses on the maintenance of Carrier Remote IPE equipment at the remote site and in the system. It requires that system non-Carrier Remote IPE functions operate correctly before you start diagnosing Carrier Remote IPE problems. The system installation and maintenance guide documents: *Meridian 1 general maintenance information* (553-3001-500), *Meridian 1 fault clearing* (553-3001-510), and *Meridian 1 hardware replacement* (553-3001-520) describe how to maintain the entire system. This chapter describes how to maintain the Carrier Remote IPE equipment as an integral part of the system.

Diagnostic tools

Diagnostic tools are used to troubleshoot problems in the system including problems with the Carrier Remote IPE. When diagnosing Carrier Remote IPE problems, you may have to use more than one of these tools.

Hardware diagnostic tools

System hardware diagnostic tools consist of:

- card self-tests
- LED indicators
- display codes
- enable/disable switches

Self-test

A self-test is automatically performed by each Carrier Remote IPE card when you insert it into an operating system module, when you enable the card, or when you power up or reset the system. You can also perform a self-test on a card using software commands.

This test checks general card functions and determines if they are operating correctly. It is useful when you first install the cards because, upon insertion, the card automatically starts the self-test and gives you an immediate indication of its operating status.

LED indicators

System cards are equipped with red LED indicators and module power supplies are equipped with green LED indicators. These indicators show the status of each card or power supply.

Carrier Remote IPE LED indicators. Both the Local Carrier Interface card and the Remote Carrier Interface card have LED indicators on the front panel. These are:

Card LED—is a red LED that indicates the status of the card. If the LED is ON, the card may be faulty or disabled. When the card is powered up, it blinks three times during self-test if functioning correctly, otherwise it turns ON and stays ON. The LED turns OFF when the card is software enabled.

Carrier LEDs—each red carrier LED is OFF when the carrier is operating correctly or it is not equipped by the MMI command **S C** (Set Configuration). If the carrier is faulty at either end, the carrier LED will turn ON and stay ON until faults are corrected at both ends.

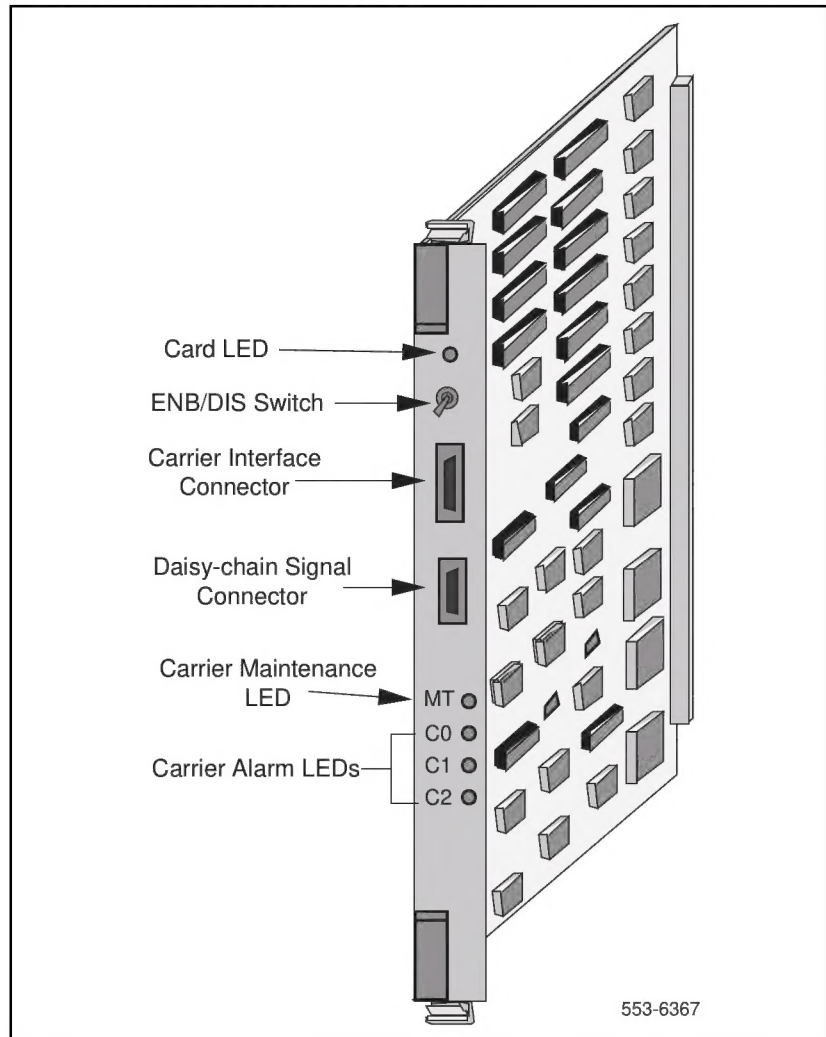
Note: Far-end alarms are communicated across the link if the MicroLink is up i. e. a carrier is good end-to-end in both directions.

Maintenance LED—is an amber LED that turns ON when the card is in the maintenance mode, i. e., when carrier tests are running by the MMI command over a carrier, or when alarms are disabled by the MMI command **A D**, or when certain option DIP switches are set incorrectly (SW1, pos 2 that selects the LCI or RCI card).

Carrier Remote IPE issues a local alarm (CRI1nnn) when a major alarm occurs at the local system site and a remote alarm (CRI2nnn) when a major alarm occurs at the Carrier Remote IPE site. In either case, the LED indicating the alarm turns red. These alarms are printed on the TTY or displayed on the maintenance terminal.

Figure 23 shows the Local Carrier Interface card. It also shows the card LED that indicates the status of the Local Carrier Interface card and each carrier link.

Figure 23
NT7R51 Local Carrier Interface card



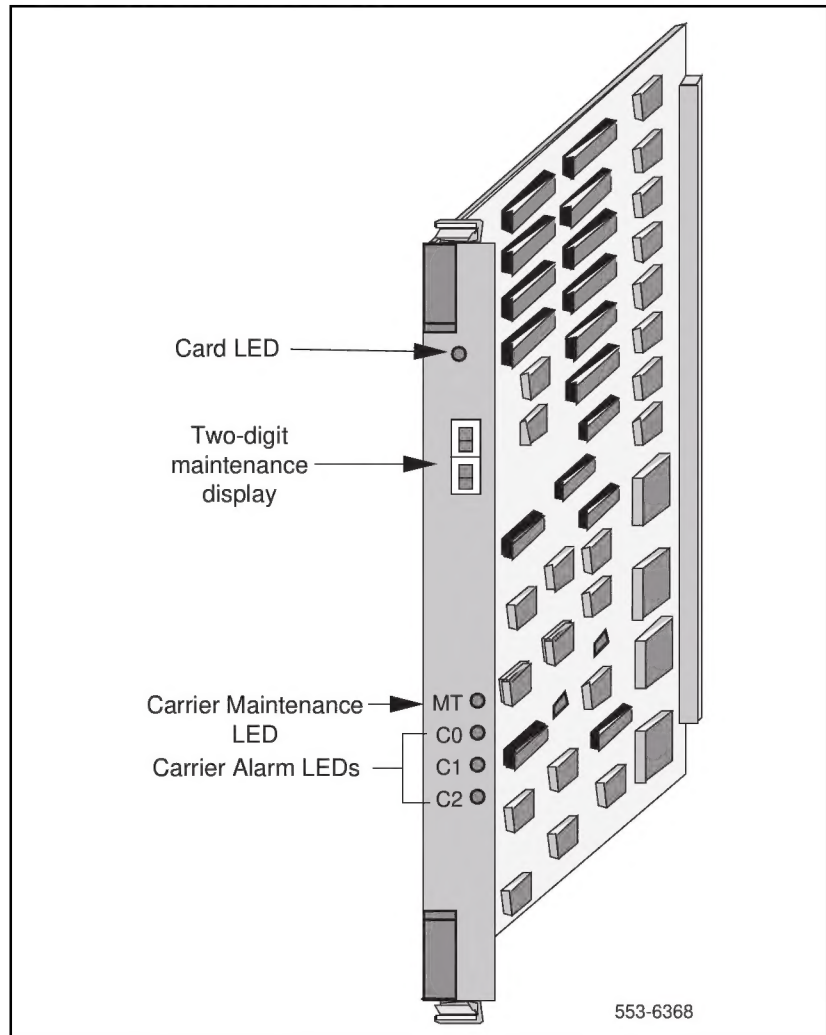
Display codes

Some system cards, such as the Remote Carrier Interface card, are equipped with an alphanumeric display on the faceplate.

Codes displayed on the common equipment cards are logged into a history file and can be printed and reviewed to analyze the sequence of events leading to the presently displayed status. The last 16 codes displayed by the Remote Carrier Interface card are stored in memory and can be reviewed and then cleared by using Network and Signaling Diagnostic Program LD 30.

Figure 24 shows two seven-segment displays on the faceplate of the Remote Carrier Interface card. They are used to automatically display the card status and identify possible faults with the card. These codes are displayed in hexadecimal notation and are listed and interpreted in Appendix A: “System messages” on page 209 and in the *X11 input/output guide* (553-3001-400).

Figure 24
Remote Carrier Interface card



Enable/disable switch

Some system cards, such as the Local Carrier Interface card shown in [Figure 23](#), are equipped with an ENB/DIS switch. This ENB/DIS switch is located on the card's faceplate. It is used to disable the card before you remove it from an operating system without disrupting other system functions. After you repair or replace the card, you can place it back in service by setting the switch to the enable position. This switch enables carrier clocking even if the Local Carrier Interface card is not software enabled.

System monitors and alarms

System monitoring units continuously monitor the environmental and power status of the system and the individual system modules including the Carrier Remote IPE equipment.

The system monitor issues alarms when the:

- CPU fails or the system reloads
- main power source is lost
- power supply in the modules fails
- system temperature exceeds limits due to blower or fan failure

System alarms are categorized for alerting and maintenance action on the type and severity of faults reported by the system monitors and indicators. These alarms are divided into:

- major alarms, which indicate serious system problems that require your immediate attention
- minor alarms, which indicate isolated faults relative to a limited number of call connection problems that do not require your immediate attention

Software diagnostic tools

System software diagnostic tools are used to monitor the system status, provide the ability to test various system functions and equipment suspected of being faulty, and log and display system fault history. Diagnostic tools are:

- resident diagnostic programs
- interactive nonresident diagnostic programs
- history file
- user reports

Resident programs

System resident programs are diagnostic and administration programs that continuously monitor system operation and report faults and generate system messages, which are displayed on the system terminal or printed on a system printer. These system messages are listed in the *X11 input/output guide* (553-3001-400).

These messages are:

- maintenance display codes listed under HEX that indicate status and error conditions in the system
- maintenance messages (CRInnnn) listed in Appendix A: “System messages” on page 209 and reported to the terminal over the Meridian 1 maintenance TTY that indicate status and faults with Carrier Remote IPE equipment
- error messages listed under SCH and ERR that indicate hardware faults and under BUG that indicate software faults
- overload messages (OVDnnn) that indicate faulty peripheral cards listed under OVD
- error messages listed under PWR that indicate power faults detected by system monitors or Remote Carrier Interface cards at remote sites
- a fault history file that can be printed and reviewed to identify fault events leading to the present status

Resident administration programs provide automatic system administration routines that facilitate system initialization and fault recovery.

These programs are:

- an overlay loader program that finds, loads, and executes all nonresident programs selected to run as midnight and background routines
- a system loader program that downloads the call processing programs and starts main memory checking when executing sysload
- a system initialization program that automatically starts after the system loader program completes the downloading process and outputs the initialization messages listed under INI in the *X11 input/output guide* (553-3001-400)
- a peripheral software download program that downloads loadware to the Local and Remote Carrier Interface cards

Nonresident programs

Nonresident programs can be interactive or automatically executed programs. These programs are stored on the system hard disk or floppy disks and are downloaded by the overlay loader program to system memory on demand or at a predetermined time of day such as for midnight and background routines testing.

You can access interactive programs through a maintenance terminal or a maintenance telephone, as described in this chapter. These programs are used to:

- test the equipment and place lines and trunks out of service when testing or faulty, and back in service when testing is completed or the line or trunk has been repaired or replaced
- verify the status of a fault
- verify that a fault has been corrected and the equipment is operating correctly

You can select a number of nonresident diagnostic programs by using Configuration Record Program LD 17. This is a program that selects other diagnostic programs and executes them automatically as midnight and background routines. These programs test the entire system and print a report that lists all the test results.

You can also manually select continuity tests that check continuity between the Local Carrier Interface card and the Remote Carrier Interface card, as well as other network and peripheral controller cards. You can specify these tests in Background Signaling and Switching Diagnostics LD 45 and Network and PE Diagnostic Program LD 32.

History file

The system can be equipped with the history file feature, which allows the system to store events such as:

- service changes
- maintenance messages
- software errors
- initialization and system download messages
- traffic messages

These messages can be printed and analyzed to identify the events that led to the present status. You can select the type of messages you wish to store. For information on how to select messages to be logged into the history file, refer to *X11 features and services* (553-3001-305).

User reports

User-reported faults may give you a clue of what failed in the system. These are:

- major alarms reported by attendant
- no ringing or no dial tone
- trouble with calls in specific Carrier Remote IPE modules
- trouble with specific terminals
- cannot transfer calls, etc.

Local and Remote Carrier Interface cards system maintenance commands

Local Carrier Interface card and Remote Carrier Interface card maintenance commands are identical to the standard NT8D04 Superloop Network and NT8D01 Peripheral Controller cards. These commands are used to manipulate the operational status and perform diagnostic tests on these cards. These commands are located in Network and PE Diagnostic LD 32, which can be accessed using the administration terminal or the maintenance telephone.

[Table 16](#) lists carrier-related superloop maintenance commands provided by Network and PE Diagnostic LD 32. The full list of LD 32 commands is described in the *X11 input/output guide* (553-3001-400). Detailed output of maintenance commands is explained in various maintenance procedures in this chapter.

Table 16
System carrier superloop maintenance commands

Command	Response	Description
DISL sl	Prompt	Disables a specific superloop
ENLL sl	OK and prompt	Enables a specific superloop
STAT sl	listing and prompt	Displays status for one or all network loops. Shows carrier alarm status, number of idle time slots per carrier, type of carrier (T1/E1), No-New-Data status, and sparing status
IDC sl		Displays the Local Carrier Interface card ID, the superloop number, and the corresponding Remote Carrier Interface card ID
	LCRI VERS=xxx FW IS SANE	Local Carrier Interface card xxx= loadware version
	aaaaaaaaaaaa	Content of the LCI card ID in the EEPROM.
	XPEC VERS=xxx FW IS SANE	Remote Carrier Interface card xxx= loadware version
	aaaaaaaaaaaa	Content of the RCI card ID in the EEPROM
XPEC	nn	Maps RCI (Peripheral Controller) to LCI (carrier superloop) and shows software status of the RCI (Peripheral Controller)
SUPL	nnn	Maps LCI (carrier superloop) to RCI (Peripheral Controller)

[Table 17](#) lists carrier-related test commands provided by Background Signaling and Switching Program LD 45. The full list of LD 45 commands is described in the *X11 input/output guide* (553-3001-400).

Table 17
System carrier test command in LD 45

Command	Response	Description
TEST		Enter the test number of the test you wish to run XCON 1 to 10.
		SL (superloop) or CR (carrier) to specify the entire superloop or just a carrier remote loop.
	PATT	Pattern (0 to 7)
	TYPG	N or P, where N= Local Carrier Interface and P= Remote Carrier Interface, is the pattern generator.
	SLOT	If TYPE SL was selected, the SLOT_STD prompt is automatically displayed. The user can then use the preexisting timeslot mapping or carriage return. If TYPE SL was selected to be a carrier, the SLOT_CARR is displayed. The user can use timeslot mapping as follows: For E1 carrier configuration use Timeslots 5 to 31 for Carrier 0 Timeslots 37 to 63 for Carrier 1 Timeslots 69 to 95 for Carrier 2 For T1 carrier configuration use Timeslots 5 to 25 for Carrier 0 Timeslots 37 to 57 for Carrier 1 Timeslots 69 to 89 for Carrier 2
	TAG	Tag number from 0 to 15 is assigned by the system.

Carrier Remote IPE MMI maintenance commands

The Local Carrier Interface card and Remote Carrier Interface card provide a man-machine interface (MMI) port to connect to a TTY or a configuration and maintenance terminal. Through this terminal you can directly issue commands to test and maintain system carrier equipment including the carrier links.

[Table 18](#) lists MMI commands that are directly issued to the system over MMI terminals, which are connected to the Local Carrier Interface card MMI port and the Remote Carrier Interface card MMI port. When entering MMI commands, separate the command letters with spaces (A space D) and [P] indicates a pause. Detailed output of maintenance commands is explained in various maintenance procedures in this chapter.

Table 18
MMI commands (Part 1 of 2)

Command	Description
A D	Alarm disable. Disables all local and remote carrier alarms. Maint LED lit.
A E	Alarm enable. Enables all local and remote carrier alarms.
C A	Clear alarm. Clears all local and remote carrier alarms.
C A L	Clear alarm log. Clears near-end alarm log.
C A L D	Clear alarm log distant. Clears far-end alarm log.
C E	Clear error. Clears local and remote error counters for a all carriers.
C E D	Clear error distant. Clears a far-end error counter for all carriers.
D A L [P]	Display alarm log [pause]. Displays near-end alarm log with pause at full screen.
D A D [P]	Display alarm log distant [pause]. Displays far-end alarm log with pause at full screen.
D C	Display configuration. Displays current configuration of the Local and Remote Carrier Interface cards.
D H [P]	Display history [pause]. Displays near-end performance counters for a specified carrier for the last 24 hours with full screen pause.

Table 18
MMI commands (Part 2 of 2)

Command	Description
D H D [P]	Display history distant [pause]. Displays far-end performance counters for a specified carrier for the last 24 hours with full screen pause.
D P	Display performance. Displays near-end performance counters for a specified carrier for the current hour.
D P D	Display performance distant. Displays far-end performance counters for a specified carrier for the current hour.
D S	Display status. Displays near-end carrier status.
D S D	Display status distant. Displays far-end carrier status.
HE or ?	Help. Displays the help screen.
HOST	Connect the SDI port. Connects to the SDI port and @@@ terminates the connection. The password is HOST .
L	Log in. Logs into the MMI terminal when the system has one Local Carrier Interface card. The password is M1LINK . Note: If logged in and you type L and an incorrect password, it will log you out.
L sl	Log superloop. Logs into a specific superloop when the system has more than one Local Carrier Interface card daisy-chained in the network module. The password is M1LINK .
Q	Quit. Logs the terminal user out.
S A	Set alarms. Set carrier alarm threshold and duration parameters.
S C	Sets carrier configuration such as equipped/unequipped, automatic clearing of LED alarm indications, and carrier sparing.
S D	Set date. Set date or verify current date.
S T	Set time. Set time or verify current time.
@@@	Terminate the terminal connection.
T	Test. Specifies a test from 1 to 5 to be run on the specified carrier link.
T D	Test distant. A test from 1 through 5 conducted from the far-end.

Using system maintenance programs

To use system maintenance programs, you must access the system using a maintenance terminal or maintenance telephone.

Logging in on the maintenance terminal

To access the program, you must enter a valid password. To do this, type **LOGI** and press the Enter key. The following appears:

```
PASS?
```

Type your password and press the Enter key. Cursor will be moving without showing characters as you type your password. If you see

```
OVL015  
>
```

you entered an invalid password. Type your password again and press the Enter key. If you entered a valid password, you will see

```
>
```

This means you are logged in. You are now communicating with Meridian 1 and can access the program.

Accessing the program

To access any program on the system, type LD followed by a space and the program number after the > prompt and press the Enter key.

For example, to access Network and PE Diagnostic Program LD 32, type **LD 32** after the > prompt and press the Enter key. At the prompt, type the command you wish to execute.

If, for example, you wish to enable network superloop #4 which is supported by a Local Carrier Interface card, at the prompt type the following:

```
.ENLL 4
```

This command will attempt to enable the Local Carrier Interface card supporting network superloop 4.

Responding to error messages

If you enter incorrect information after a prompt, the program displays a warning message or an error message. The prompt is displayed again below the error message so you can enter the correct information.

Exiting the program

To exit the program, type ******** and press the Enter key. You see

```
>
```

This means you have successfully exited the program. Now you can either access another program or log out.

Logging out

After you exit the program, you should log out. To do this, type **LOGO** at the **>** prompt and press the Enter key.

Logging in and using a maintenance telephone

You can use a telephone as a maintenance terminal if you define its class of service as MTA (maintenance set allowed) in Telephone Set Program LD 11. This feature allows you to access diagnostic programs in the system and execute a limited set of maintenance commands to test system functions.

To enter commands on a maintenance telephone, you use its keypad. The numbers on the keypad represent numbers and letters that you normally use on a video display terminal keyboard.

Table 19 shows the translation from a terminal keyboard to a telephone keypad.

Table 19
Keyboard to keypad translation table

Terminal keyboard				Telephone key pad
			1	1
A	B	C	2	2
D	E	F	3	3
G	H	I	4	4
J	K	L	5	5
M	N	O	6	6
P	R	S	7	7
T	U	V	8	8
W	X	Y	9	9
			0	0
			Space or #	#
			Return	##

To use a diagnostic program on the system:

- 1 Press the prime DN key.
- 2 Place the telephone in the maintenance mode by entering **xxxx91** on the keypad, where **xxxx** is the customer's special prefix number (SPRE) as defined in LD 15. Normally xxxx is 1, thus you would enter **191**.
- 3 Enter ****** to check if the communication link is idle.
- 4 If you detect a busy tone, the system is in session with another maintenance or administration terminal. Enter ******** to force the other terminal to log out. If you do not detect a busy tone, the system is idle and you can automatically access the system.

- 5 Enter **53#xx##** to load a diagnostic program, where **xx** is the program number. For example, to load Network and PE Diagnostic Program LD 32, enter **53#32##**.
- 6 Perform the maintenance tasks by executing the maintenance commands resident in the program you loaded. For example, from Network and PE Diagnostic Program LD 32 you can disable a network loop by executing **DISL loop**, where loop is the Local Carrier Interface card loop, say 3. To execute this command enter **3475#3##** on the keypad.
- 7 Press the Release key to log out.

Isolating and correcting faults

Now that you are familiar with the troubleshooting tools, you can begin troubleshooting Carrier Remote IPE equipment. Based on whether Carrier Remote IPE equipment has just been installed and is not yet operational or it had been operating correctly and is now faulty, you can determine what may be the most probable cause of failure.

Type of faults

Problems can occur in the following areas:

- hardware
- configuration
- software

The type of faults that you have to isolate and correct depends on whether faults occur during installation or due to component failure in a previously operating system. For example, in a newly installed system the fault may be in any or all of the three areas. However, in a previously operating system the fault will probably be in the hardware.

Fault isolation steps

The following steps show you how to isolate system and Carrier Remote IPE faults using the diagnostic tools described in this chapter:

- 1** Observe and list the problem symptoms the system is exhibiting. Typical symptoms can be: the Local Carrier Interface card or Remote Carrier Interface card has its red LEDs turned on the Remote Carrier Interface card faceplate display shows a fault code, some common equipment or power supplies have their green LEDs turned off, some of the common equipment or network cards display codes that indicate faults, and so on.
- 2** Note if Carrier Remote IPE was just installed and has not been operating, or if it has been operating correctly and is now faulty. Based on this, refer to "Newly installed Carrier Remote IPE" below for lists of the most common problems.
- 3** Take the action recommended by the fault isolation and correction tables, which guide you through fault isolation steps and recommend what test procedures to use.
- 4** If after following the diagnostic procedures Carrier Remote IPE still does not operate correctly, contact your field service representative.

Newly installed Carrier Remote IPE

Problems that occur during the installation of an entire system including the Carrier Remote IPE are usually caused by:

- improperly installed cards
- loose or improperly connected external communication cables, internal cables, or carrier link cables
- incorrect software version
- incorrect Carrier Remote IPE configuration

These types of problems can also occur when:

- installing additional Carrier Remote IPE equipment into an already operating system
- installing a new software version or changing the Carrier Remote IPE configuration

Check the symptoms listed in [Table 21](#) that are related to problems with a newly installed Carrier Remote IPE.

Previously operating Carrier Remote IPE

Problems that occur during the normal operation of Carrier Remote IPE are usually caused by:

- faulty equipment
- accidental disconnection of cables
- improper environmental conditions

Check the symptoms listed in [Table 21](#) that are related to problems with a previously operating Carrier Remote IPE.

System fault isolation and correction

To isolate Carrier Remote IPE faults in the system, you must first isolate and correct the common, network, and power equipment faults to make the system non-Carrier Remote IPE functions operational. You can then proceed with fault isolation and fault correction of Carrier Remote IPE functions.

To aid you in isolating the problems in a systematic way, use the fault isolation and correction tables. These tables guide you through logical steps to determine the cause of the problem based on the visual fault indicators and system fault messages that you see.

[Table 20](#) lists system problem symptoms, diagnosis of the problem based on the observed symptoms, and a recommended solution to the problem.

Table 20
System common and network equipment problems

Symptoms	Diagnosis	Solution
Green LED on the power equipment is off.	Power source lost, power defective, or disconnected power cables.	Check the power source, circuit breakers, and power cables. Refer to <i>Meridian 1 fault clearing</i> (553-3001-510) to correct the problem.
Maintenance terminal displays PWRxxxx messages.	Power supply, Power Distribution Unit, or Blower/Fan unit defective.	Refer to <i>X11 input/output guide</i> (553-3001-400) for a list of PWR messages. Based on the message, take the appropriate action to resolve the problem.
Some red LEDs on the common, network, and/or peripheral equipment are on and call processing has stopped.	Common or network equipment cards faulty. Peripheral equipment cards faulty.	Observe the error messages on the terminal and check for ERR and/or BUG messages listed in <i>X11 input/output guide</i> (553-3001-400). Use this information to locate and correct the fault. Refer to <i>Meridian 1 fault clearing</i> (553-3001-510).
Maintenance terminal displays OVDxxxx messages.	Excessive input messages from IPE cards, peripheral signaling card, network cards, and/or IPE cabling.	Observe the OVD messages on the terminal and check the description of these messages listed in <i>X11 input/output guide</i> (553-3001-400). Use this information to locate and correct the fault. Refer to <i>Meridian 1 fault clearing</i> (553-3001-510).
Maintenance display codes on the CPU cards and storage devices show fault codes.	Common equipment disk drive hardware faults, memory faults, or interrupt faults.	Refer to <i>X11 input/output guide</i> (553-3001-400) for a list of all the HEX codes. Based on the maintenance display codes description, take the appropriate action and resolve the problem.
Maintenance display codes on network cards show faults.	Indicates bus error or card problem.	Reinsert the card and observe the self-test codes. Refer to <i>X11 input/output guide</i> (553-3001-400) for a list of all self-test codes and their description. If the problem remains, replace the card.
Major or minor alarms.	Common, network, and/or peripheral equipment failure.	Refer to <i>Meridian 1 fault clearing</i> (553-3001-510) to identify the cause of alarm. Check the history file.

After you isolated and corrected common equipment and network equipment faults, all the other system and card faults may clear and the system may start operating normally. If this does not occur, you must proceed with troubleshooting Carrier Remote IPE equipment as described in [“Remote Carrier Interface card fault isolation and correction” on page 194](#).

If you cannot resolve the problem after exhausting all the available diagnostic tools and test procedures, make a list of all the symptoms you observed and contact your field service representative.

Carrier Remote IPE fault isolation and correction

After non-Carrier Remote IPE system functions are operating correctly, you can proceed with fault isolation and fault correction of Carrier Remote IPE equipment.

If you cannot resolve the problem after exhausting all available diagnostic tools and test procedures, make a list of all the symptoms you observed and contact your field service representative. Refer to Table 22 on page 209 in Appendix A to identify the HEX codes that indicate possible problems with the Carrier Remote IPE.

[Table 21](#) deals specifically with Carrier Remote IPE service problems. To diagnose these problems, the table refers you to the test procedures in this manual that will most likely be able to resolve these problems based on the symptoms these problems are exhibiting.

Table 21
Carrier Remote IPE equipment problems (Part 1 of 2)

Symptoms	Diagnosis	Solution
Red card LED on the Local Carrier Interface or Remote Carrier Interface is permanently on.	Card is disabled or faulty.	Go to Procedures 1, 2, and 4 in this chapter to check the card status and perform self-test. Also go to Procedure 7 to check the carrier status using the MMI terminal commands.
Carrier LEDs show alarm condition.	One or more carrier alarm LEDs are on. No activity on the carrier.	Alarm Level 2 or 3. Alarm Level 2 allows voice calls but no new data calls on the carrier. Check carrier link connections and go to Procedure 3 to test the link using the loopback test.

Table 21
Carrier Remote IPE equipment problems (Part 2 of 2)

Symptoms	Diagnosis	Solution
Carrier link is OK but remote TTY cannot access system.	Protocol not set properly or terminal not in SDI mode.	Check the protocol setup and make sure the MMI terminal is in the host SDI mode.
No communication with the system monitor.	System monitor address incorrect.	Observe the system messages on the MMI terminal and check the description of these messages listed in Appendix A. Use this information to locate and correct the fault.
Display on the Remote Carrier Interface card shows fault codes.	Card faulty, failed self-test or problem communicating with peripheral equipment.	Go to Procedures 4 and 5 to check tracking and loopback. Also refer to <i>X11 input/output guide</i> (553-3001-400) for a list of codes. Based on the maintenance display codes description, take the appropriate action and resolve the problem.
Error messages printed on the MMI terminal or the Meridian 1 TTY.	Hardware or software problems with the Carrier Remote IPE.	Note various error messages. Refer to Appendix A and <i>X11 input/output guide</i> (553-3001-400) for a list of these messages and their description. Based on the code's description, take the appropriate action to resolve the problem.
Signaling works but no talk path.	Carriers are crossed over. External loopback left in place no end-to-end connection.	Check each carrier and make sure they are not crossed over. Refer to "Connecting the carrier link to the Remote IPE module" on page 115. Remove the external loopback.
Amber maintenance LED is on.	Test is performed over one or more carrier in the link. Alarms disabled. SW1 position 2 set wrong.	Wait until the test is completed and analyze the test data. Enable the alarms. Set SW1 position 2 correctly.
Near and far end Alarm Level 2 or Alarm Level 3.	Carrier network, and/or peripheral equipment failure.	Query the alarm status on carrier links by entering the DAL[P] command to display the near-end log file and DAD[P] to display the far-end log file. Check alarm settings with DC command.
Messages corrupted (ERR080).	Hardware problems.	Check Procedures 1 through 5.

Local Carrier Interface card fault isolation and correction

The Local Carrier Interface card provides a communication interface between the CPU and the Remote Carrier Interface card.

The Local Carrier Interface card processes signaling information and data received from the Remote Carrier Interface card over the carrier link.

Problems with the Local Carrier Interface card may be caused by hardware faults, incorrect configuration, a disabled Local Carrier Interface card, or continuity problems between the card and other network cards connected to the network bus. To isolate and correct the Local Carrier Interface card-related problems, follow [Procedures 1, 2, and 3](#).

Procedure 1

Checking the Local Carrier Interface card status

The diagnosis in [Table 21](#) indicates that the Local Carrier Interface card may be faulty or disabled. The first step in identifying the problem is to verify the status of the Local Carrier Interface card. The status of a Local Carrier Interface card is obtained by executing the **STAT sl** command in Maintenance and Diagnostic Program LD 32.

To obtain the Local Carrier Interface card status:

- 1 Log in on the maintenance terminal as described in ["Using system maintenance programs" on page 178](#).
- 2 At the > prompt, type **LD 32** and press the Enter key to access the Maintenance and Diagnostic Program LD 32.
- 3 Type **STAT sl** and press the Enter key, where **sl** is the superloop number. It shows the highest alarm value of both cards you are checking. The far-end alarm does not show at the near end.

LD 32

NPR000

STAT sl

CARR	CALS	TTSA	NND	SPARED
0	0	21/21	NO	N/A
1	0	21/21	NO	N/A
2	0	21/21	NO	N/A

Note: This example shows 3 primary carriers and no spare, all carriers without alarm, and are available for New Data Calls. No calls in progress.

LD 32

NPR000

STAT sl

CARR	CALS	TTSA	NND	SPARED
0	3	0/21	YES	N/A
1	0	21/21	NO	N/A
2	0	21/21	NO	N/A

Note: This example shows 3 primary carriers and no spare, carrier 0 in los-of-signal (LOS) fault status.

LD 32

NPR000

STAT sl

CARR	CALS	TTSA	NND	SPARED
0	0	21/21	NO	NOT SPARED
1	0	21/21	NO	NOT SPARED
2	0	N/A	N/A	AVAIL

Note: This example shows 3 carriers equipped, carrier 2 is spared and available, and are available for New Data Calls. No calls in progress.

LD 32

NPR000

STAT sl

CARR	CALS	TTSA	NND	SPARED
0	3	21/21	NO	SPARED
1	0	0/21	YES	NOR SPARED
2	0	N/A	N/A	SPARING FOR 0

Note: Carrier 1 unequipped and carrier 2 sparing for carrier 0.

Parameter description:

CARR—Carriers 0, 1, and 2

CAL—Carrier alarm status (0 means that the Alarm Level is 0—no alarm)

TTSA—Timeslots currently available for voice and data

Carrier 0 superloop timeslots (5 to 25) for T1 and (5 to 31) for E1

Carrier 1 superloop timeslots (37 to 57) for T1 and (37 to 63) for E1 carriers

Carrier 2 superloop timeslots (69 to 89) for T1 and (69 to 95) for E1 carriers

NND—No New Data calls. (NO—indicates new data calls are not disallowed) i.e. MCAs may originate or terminate new data calls

SPARED—Indicates if a carrier is spared by carrier 2. N/A indicates that carrier 2 is equipped as a primary not a spare carrier.

If carrier 2 is configured as a spare, the traffic will be handled by carrier 0 and carrier 1 reducing the traffic capacity to 2/3, but by providing a spare, established calls are protected if one of the primary carrier links fails.

Note: If overload conditions are indicated by OVDxxx messages. Refer to *X11 input/output guide* (553-3001-400) for the message description and indication of the problem.

If the message indicates that the Local Carrier Interface card is faulty, replace the card.

Procedure 2**Performing the Local Carrier Interface card self-test**

If the Local Carrier Interface card is faulty, you should conduct the self-test to verify that it is actually faulty before you replace it. This test verifies the basic Local Carrier Interface card functions and outputs a fail or pass message after the test is completed.

To start the self-test:

- 1 Log in on the maintenance terminal as described in ["Using system maintenance programs" on page 178](#).
- 2 At the > prompt, type **LD 32** and press the Enter key to access the Network and PE Diagnostic Program.
- 3 Type **DISL sl** and press the Enter key to disable the Local Carrier Interface card, where **sl** is the Local Carrier Interface card superloop number you are disabling.

- 4 Type **XNTT sl** and press the Enter key to start the self-test, where **sl** is the Local Carrier Interface card superloop number specified for self-test.

If the response is:

TEST PASSED

the Local Carrier Interface card passed the self-test and is functional but must be enabled to turn off the red LED and become active.

If the Local Carrier Interface card passed the self-test, but the problem persists, the carrier link or other cards that interface with the Local Carrier Interface card may be faulty. To verify the integrity of the network bus and connections between the Local Carrier Interface card and other network and peripheral equipment cards interfacing with the Local Carrier Interface card, go to [Procedure 3](#).

If the response is:

TEST FAILED REASON: xxxx

XPEC NOT CONNECTED

the Local Carrier Interface card failed the self-test and is faulty, where **xxxx** can be one of the following values:

0—ROM checksum failed
1—FLASH checksum failed
2—A21 #1 faulty
3—A21 #2 faulty
4—R71 faulty

Replace the Local Carrier Interface card as described in "[Removing and replacing a Local Carrier Interface card](#)" on page 205. NPRxxx message may be displayed as a result of a command-activated self-test if the Local Carrier Interface card is missing, not configured, and so on.

- 5 Exit LD 32 by typing ******** at the prompt.

Procedure 3

Performing the Local Carrier Interface system loopback tests

If the Local Carrier Interface card self-test indicates that the card is not faulty, you should conduct loopback tests to isolate the problem that may exist on network cards, network buses, or carrier link connections between the Local Carrier Interface card and the Remote Carrier Interface card.

The system loopback test is not service interrupting. However, if carrier 2 is not a spare carrier but an primary carrier, the system may respond with error message BSD202 if TEST ALL command is executed in LD 45. To avoid this problem, do not perform the TEST command manually on the system that has one or more Carrier Remote superloops with carrier #2 configured as an active carrier.

Loopback tests check the continuity between various interface points in the system. This is performed by sending a known signal pattern from the originating point to the destination and receiving it back at the originating point or a designated detecting point. If the pattern is detected and it matches the transmitted pattern without errors, the test verifies that the tested equipment and their connections are operating correctly. However, if the pattern is not detected or it is detected with errors, the equipment or the connections between the equipment are faulty.

The difference between loopback tests for the Carrier Remote IPE and the Superloop Network and Peripheral Controller cards is the selection of specific timeslots that have to be assigned for the Carrier Remote IPE loopback testing.

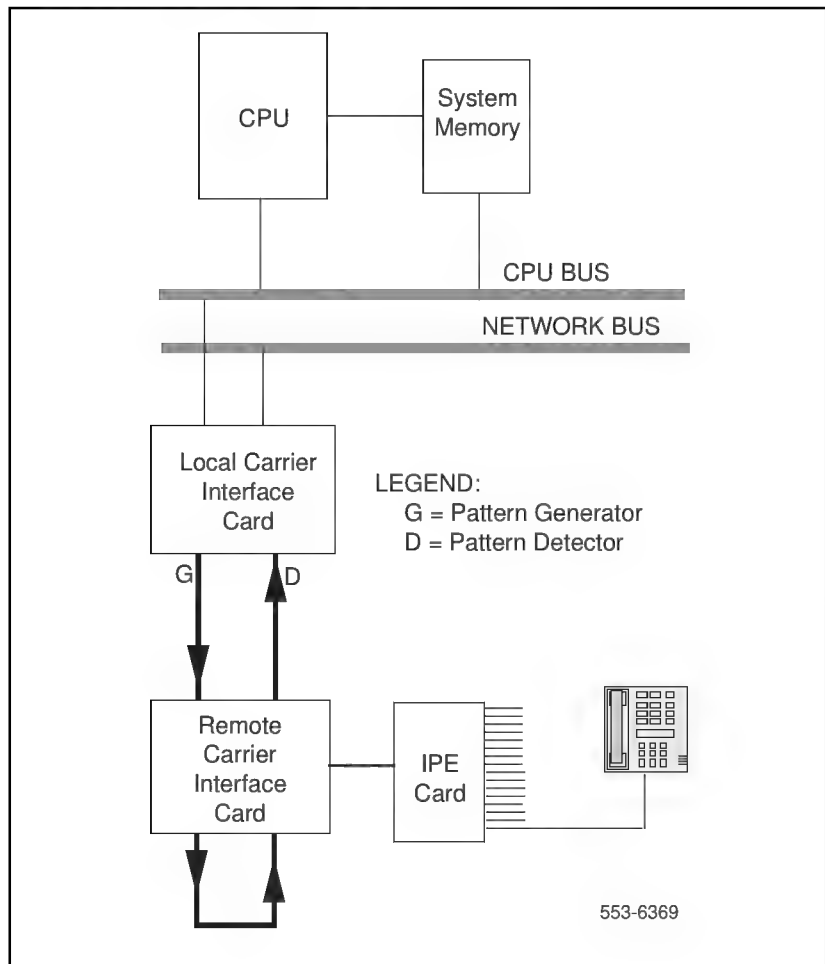
The system loopback test also tests the superloop network switching functions and the peripheral controller loopback functions on the Local Carrier Interface card and the Remote Carrier Interface motherboards respectively. Where, the on-line test 1, using the MMI command, tests the loopback between the daughterboards of these two cards.

The loopback uses the Local Carrier Interface card as a pattern generator and detector. For example, the signal is transmitted by the Local Carrier Interface card to the Remote Carrier Interface card and looped back to the Local Carrier Interface card over the carrier links.

Note: For a Carrier Remote IPE with a spare link, the loopback is automatically routed over the functioning carrier link, not the faulty link. To identify the carrier that may be faulty, you can perform the carrier test at each end of the link by following the instructions in step 4 of this procedure.

Figure 25 illustrates the loopback path and shows the Local Carrier Interface card as a test pattern generator and detector.

Figure 25
Loopback path for XCON test 6



To start the loopback test:

- 1 Log in on the maintenance terminal as described in [“Using system maintenance programs” on page 178](#).
- 2 At the > prompt, type **LD 45** and press the Enter key to access the Background Signaling and Switching Program.
- 3 Select test condition:
 - Enter XCON 0 and press the Enter key if you wish to perform only one loopback test.
 - Enter one test period shown in XCON H 1-255, M 1-255, S 1-255 and press the Enter key to select continuous loopback testing for a selected time span, where H 1-255 is 1 to 255 hours, M 1-255 is 1 to 255 minutes, and S 1-255 is 1 to 255 seconds.

Example: XCON M 5 specifies the duration of the test to be 5 minutes.

- 4 At the TEST prompt, type **6** and press the Enter key to test the loop from the Local Carrier Interface card through the carrier link and the Remote Carrier Interface card back to the Local Carrier Interface card. Continue responding to the prompts to configure the loopback test as follows:

Command	Range	Description
TEST	6	XCON test number
PATT	0–7	Signal pattern
TYPE	CR	Carrier transmission type
TYPG	N	Local Carrier Interface card—generator
SUPL	0–156	Superloop in multiple of 4
SLOT_CARR	xx	Carrier timeslots ranges: E1 Carrier 0 (5–31) E1 Carrier 1 (37–63) E1 Carrier 2 (69–95) T1 Carrier 0 (5–25) T1 Carrier 1 (37–47) T1 Carrier 2 (69–89)
TYPD	N	Local Carrier Interface card—detector
SUPL	0–156	Superloop in multiple of 4
LBTY	P	Loopback through Remote Carrier Interface card
LBTN	11 s 99	Special Remote Carrier Interface loopback channel
TAG x	0–15	Tag number assigned by the system

- 5 Check the loopback test results. The results are automatically displayed if you specified XCON 0 test conditions; otherwise, you must specify XSTA or XSTP with the test TAG number to check the status. XSTA gets the status of the manual continuity test and XSTP stops the manual continuity test. If the results show BSDxxx messages, refer to the list and description of these messages in *X11 input/output guide* (553-3001-400). The BSDxxx messages indicate the possible causes of the problem, which you should check to isolate the actual problem.
 - If the loopback continuity test passes, the problem may be somewhere in the IPE cards.
 - If the loopback continuity test fails, go to [Procedure 4](#).

Remote Carrier Interface card fault isolation and correction

The Remote Carrier Interface card provides a communication interface between the Local Carrier Interface card and the IPE cards housed in the Carrier Remote IPE module or cabinet.

Problems with the Remote Carrier Interface card may be caused by hardware faults, incorrect configuration, a disabled Remote Carrier Interface card, or continuity problems between the card and IPE cards connected to the peripheral bus. To isolate and correct the Remote Carrier Interface card-related problems, follow procedures 4 and 5.

Procedure 4

Performing the Remote Carrier Interface card self-test

If the Remote Carrier Interface card is faulty, you should conduct the self-test to verify that it is actually faulty before you replace it. This test verifies the basic Remote Carrier Interface card functions and outputs a fail or pass message after the test is completed. During self-test the Remote Carrier Interface card displays HEX messages indicating the test performed. To identify the codes displayed, refer to Table 22 on page 209.

To start the self-test:

- 1 Log in on the maintenance terminal as described in [“Using system maintenance programs” on page 178](#).
- 2 At the > prompt, type **LD 32** and press the Enter key to access the Network and PE Diagnostic Program.
- 3 Type **DSXP x** and press the Enter key to disable the Remote Carrier Interface card, where **x** is the number of the Remote Carrier Interface card you are disabling.

- 4 Type **XPCT x** and press the Enter key to start the self-test, where **x** is the Remote Carrier Interface card specified for self-test.

If the response is

TEST PASSED

the Remote Carrier Interface card passed the self-test and is functional but must be enabled to turn off the red LED and to start processing calls.

Type **ENXP x (v)** and press the Enter key to enable the card and the associated IPE cards, where **x** is the Remote Carrier Interface card number and **(v)** is the optional download software version **v**.

If the Remote Carrier Interface card passed the self-test, but the problem persists, the carrier link or other cards that interface with the Remote Carrier Interface card may be faulty. To verify the integrity of the peripheral bus and the Remote Carrier Interface card, go to [Procedure 5](#).

If the response is

TEST FAILED REASON: xxxx

the Remote Carrier Interface card failed the self-test and is faulty, where **xxxx** specifies the cause of the fault. An NPRxxx message may be displayed as a result of a command-activated self-test if the Remote Carrier Interface card is missing, not configured, etc.

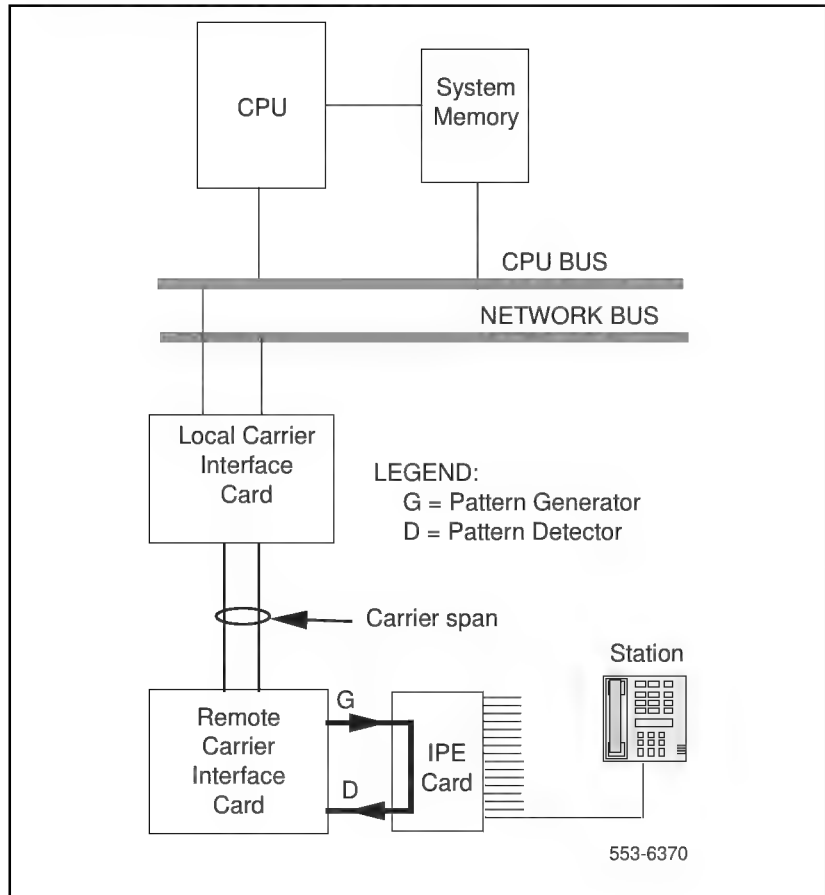
- 5 Exit LD 32 by typing ******** at the prompt.

Procedure 5
Performing the Remote Carrier Interface card loopback test

The loopback uses the Remote Carrier Interface card as a pattern generator and detector. The signal is transmitted by the Remote Carrier Interface card back to the Remote Carrier Interface card over a timeslot of a specified carrier.

[Figure 26](#) illustrates the loopback path and shows the Remote Carrier Interface card as a test pattern generator and detector.

Figure 26
Loopback path for XCON test 7



To start the loopback test:

- 1 Log in on the maintenance terminal as described in [“Using system maintenance programs” on page 178](#).
- 2 At the > prompt, type **LD 45** and press the Enter key.
- 3 Select the test condition. Enter XCON 0 and press the Enter key if you wish to perform only one loopback test.
 - Enter one test period shown in XCON H 1-255, M 1-255, S 1-255 and press the Enter key to select continuous loopback testing for a selected time span, where H 1-255 is 1 to 255 hours, M 1-255 is 1 to 255 minutes, and S 1-255 is 1 to 255 seconds.

Example: XCON M 5 specifies the duration of the test to be 5 minutes.

- 4 At the TEST prompt, type **7** and press the Enter key to test Remote Carrier Interface to Remote Carrier Interface through a special loopback channel. Continue responding to the prompts to configure the loopback test as follows:

Command	Range	Description
TEST	7	XCON test number
PATT	0–7	Signal pattern
TYPG	P	Remote Carrier Interface card—generator
TN	1 s 99 0	Special Remote Carrier Interface loopback channel
TAG x	0–15	Tag number assigned by the system

- 5 Check the loopback test results. The results are automatically displayed if you specified XCON 0 test conditions; otherwise, you must specify XSTA or XSTP with the test TAG number to check the status. XSTA gets the status of the manual continuity test and XSTP stops the manual continuity test. If the results show BSDxxx messages, refer to the list and description of these messages in *X11 input/output guide* (553-3001-400). The BSDxxx messages indicate the possible causes of the problem, which you should check to isolate the actual problem.
 - If the loopback continuity test passes, the problem may be somewhere in the IPE cards.
 - If the loopback continuity test fails, replace the card.

Fault isolation and correction using MMI maintenance commands

You can perform some testing and troubleshooting of the Carrier Remote IPE from a local or a remote MMI terminal or TTY by typing MMI commands on the terminal without loading system diagnostic programs (overlays).

These commands provide current equipment status, invoke card testing, check equipment performance, and print messages from log files.

Procedure 6

Checking Carrier Remote IPE status using MMI commands

This procedure uses MMI commands to maintain Carrier Remote IPE cards and carrier status.

In the MMI mode the terminal issues direct commands to the system to display operational conditions, to set up carrier parameters, and to test individual carrier links.

To obtain the Local and Remote Carrier Interface card status:

- 1 Log in on the MMI maintenance terminal:

CRI::>L

Login command

Enter Password > **M1LINK**

Type in the password.

- 2 Type **D S** to display near-end carrier status. Type **D S D** to display far-end carrier status.

The response is displayed on the screen and shows: the firmware version, present time and date, individual carrier fault threshold parameters, and the present status of each carrier link.

Example:

CRI::>D S

CRI Remote IPE S/N Software Version x.xx mm/dd/yy hh:mm

Remote Site

In Alarm State: NO (carriers are not in the alarm state)

All Link Maps Normal

Link 0 Alarm Level 0

Link 1 Alarm Level 0

Link 2 Alarm Level 0

If carrier links mismatch exists, the status will display unequal alarm levels across a mismatched link. To verify that carrier links are connected correctly at both ends perform the tests in "Verifying carrier link connections at the remote site" on page 147 in the Installation section.

- 3 Display the alarm log by executing the **D A** and the **D A D** commands to see the list of the most recent 100 alarms with the date and time they occurred.

Procedure 7 Checking the carrier performance status

The Remote Carrier Interface card can display carrier performance information for the current hour and for the last 24 hours. The data and total errors are shown separately in the report for both the local and the remote site. The report displays the bit error rate, loss of frame count, loss of signal, alarm indication count, and frame slip count. To obtain the information for the current hour, execute command **D P** (Display performance) for near-end or **D P D** (Display performance distant) for the far-end carrier performance status using the MMI terminal.

To obtain the carrier link performance status:

- 1 Log in on the maintenance terminal as described in ["Using system maintenance programs" on page 178](#).
- 2 At the > prompt, type **D P** and press the Enter key.

The report displays the following carrier error counts monitored for 45 minutes for carrier 1

CRI::> D P

Which Carrier (0, 1, or 2): 1

IPE Interface Performance Log

For Carrier Number 1

8/15/95 9:45

Data for the first 45 Minutes

Errored Seconds	Bursty Seconds	Severely Eroded Seconds	Unavailable Seconds	Loss Frame Seconds	Frame Slip Seconds	Error Counter
0	0	0	0	0	0	1

Note: These performance measurements indicate the service quality of the carrier link you selected (carrier 1 in this example). Ideally all errored second categories should be 0. If a number other than 0 appears in one or more columns, it indicates momentary or continuous problem on the link. If the numbers are small and the carrier is not in alarm state, the errors may have been temporary and the link may continue to operate within the specified thresholds. You may clear the cumulative error counter by executing the **CE** and **CED** commands. This error clearing does not affect the errored second counters.

- To display a similar report for the 24 hour period listed in 1 hour increments execute the **DH** (Display history) for the near-end or **DHD** (Display history distant) for the far-end.

CRI:> D H

Which Carrier (0, 1, or 2): 1

IPE Interface History Performance Log

For Carrier Number 1

8/15/95 9:45

Hour Ending	Errored Seconds	Bursty Seconds	Unavailable Seconds	Loss Frame Seconds	Frame Slip Seconds	Error Counter
9:00	0	0	0	0	0	0
8:00	1	0	0	0	0	1
7:00	0	0	0	0	0	0
0:00	0	0	0	0	0	0
23:00	1	1	0	0	0	1
22:00	0	0	0	0	0	0
21:00	0	0	0	0	0	0
11:00	1	1	1	1	1	1
10:00	0	0	0	0	0	0

Note: This report list the 24-hour performance history for this carrier. Ideally all the parameters should show 0 for optimum performance. However, if the carrier is not in alarm state, it may continue to perform within the specified threshold limits.

Procedure 8**Disabling a carrier when idle to check the carrier sparing function or to perform off-line carrier tests**

- 1 Execute the **S C** command to disable the primary carrier of your choice. This command allows the calls in progress to complete before the carrier can be disabled. The MMI terminal displays the following screen to allow you to change carrier status:

To disable carrier 1 (set Equipped carrier 1 parameter to N):

CRI::> S C	To set carrier parameters
Equipped carrier 0 (Yes or No) Y	Enable carrier 0. Enter Y to enable or N to disable.
Equipped carrier 1 (Yes or No) N	Disable carrier 1.
Equipped carrier 2 (Yes or No) Y	To enable carrier 2
Enable #2 for Spare (Yes or No) Y	Defines carrier 2 as spare
Enable self clearing Alarms (Yes or No) N	To enable/disable alarm clearing

- 2 Track the number of calls still active on carrier 1 by executing the **STAT** command:

LD 32

NPR000

STAT sl

CARR	CALS	TTSA	NND	SPARED
0	0	19/21	NO	NOT spared
1	1	18/21	YES	NOT spared
2	0	21/21	NO	NOT spared

Note: In the CALS column for carrier 1, it shows that carrier alarm status has alarm level 1 and no new data is allowed.

Procedure 9**Testing the carriers**

- 1 After you check the carrier status report and performance log and you find that one or more carriers are faulty, proceed to isolate the cause by testing the carriers using the **T** (test) command.

There are two types of tests that can be performed using the **T** command. These are on-line tests and off-line tests.

The **on-line carrier test (Test #1)** is end-to-end carrier test performed without affecting the system performance and determines that a failure exists but cannot pinpoint the faulty component. Perform Test #1 on a known good carrier to switch signaling communication over this carrier. Don't test a carrier in alarm condition using Test #1, it may disrupt traffic for the duration of the test. A better approach is to disable the carrier you wish to test and perform one of the other tests to determine where the problem lies.

Note: Disabling a carrier will prevent any new calls being placed over that carrier; however, it will not effect calls in progress over the disabled carrier. Performing Test #2 or #3 on a carrier will interrupt any calls in progress over that carrier for the duration of the test.

The **off-line carrier tests (Tests #2, #3, #4, and #5)** isolate the failure to a field-replaceable unit. These tests are usually performed on carriers that are not carrying traffic. The user must specify the carrier to be tested and the duration of the test.

Test #2 tests the near-end card by looping back the carrier link side and verifies if the card is good.

Test #3 tests the far-end card by looping back the carrier link side on the distant card and verifies if that card is good.

Test #4 tests the carrier link side by looping back at the near-end or far-end CSU to test the link from the telco demarcation point to the Meridian 1 or Carrier Remote IPE or from the far-end CSU to test the carrier link.

Test #5 provides a near-end loopback on the card to allow the distant testing of the near-end card across the carrier link.

Note: Test #2 and #3 may show occasionally false failure indication when a false bit error is detected by the test logic falsely indicating a test failure. If only one or two errors are shown out of 15 tests, try the test again. If the test passes on the second or third attempt, the carrier is probably performing correctly. To verify the performance, execute C A and C A D to clear errors. Then display performance by executing the D P and D P D commands. The carrier is operational if no additional errors are detected. The STOP command terminates a test prematurely; however, it does not terminate the remote loopback during carrier Test #3 and may interrupt the traffic for several seconds. If the STOP command causes a problem, execute Test #3 again with 0 duration to undo the far-end loopback or do not use the STOP command on Test #3.

Test 5 places the carrier in the loopback and test 4 works only if you first establish an external loopback at the network or at the far-end.

Split pairs in the twisted pair patch cable between the telco network interface and the Local and Remote Carrier Interface cards may cause repetitive loss of frame errors despite passing loopback tests on both ends of the cable.

- 2 Logon and type **T** and press the Enter key to display the selection of tests. Select the appropriate test and press the Enter key:

CRI:>L

Enter Password: M1LINK

CRI::>L

CRI::>T

Test 1: Online Test

Test 2: Near End Loopback Test

Test 3: Remote Loopback

Test 4: Network Loopback

Test 5: Loop only

(1, 2, 3, 4, 5, or S to cancel): 1

Which carrier (0, 1, or 2): 2

Carrier Currently ENABLED

Enter Duration of Test (1-98 minutes, 0= once, 99= forever): _

Test will not interfere with calls in progress

Hit Q to quit or any key to continue

Near End Testing

Carrier 2 Test 1 Completed. Total Test 1 Total Errors 0.

If an off-line test is selected, the user is prompted with:

**This test will interfere with calls currently in progress, continue ?:
(Y or N): _**

- 3 Check the results of the test and correct the identified fault. Replace the faulty card or fix the problem in the carrier link if so indicated in the test report.

Replacing Carrier Remote IPE cards

If after completing troubleshooting you determine that one or more Carrier Remote IPE cards are defective, you will have to remove them and replace them with spares. When you insert a spare Local Carrier Interface card or a Remote Carrier Interface card into the module or Carrier Remote IPE cabinet, observe the card LED (the uppermost LED on the faceplate) to determine if the card passed the self-test. Package and ship the defective cards to an authorized repair center.

Unpacking replacement cards

Unpack and visually inspect replacement cards as follows:

- 1 Inspect the shipping container for damage. Notify your distributor if you find that the container is damaged.
- 2 Remove the unit carefully from the container. Do not puncture or tear the container; use a utility knife to open it. Save the container and the packing material for shipment of the defective card.
- 3 Visually inspect the replacement card for obvious faults or damage. Report the damage to your sales representative.
- 4 Keep cards in their antistatic bags until you are ready to install them. Do not stack them on top of each other.
- 5 Install cards. When handling the cards, hold them by their nonconductor edges to prevent damage due to static discharge.

Removing and replacing a card

A Carrier Remote IPE card can be removed from and inserted into a Meridian 1 module or the Remote IPE module or Carrier Remote IPE cabinet without turning off the power to the module or cabinet. This feature allows Meridian 1 to continue normal operation when you replace a Local Carrier Interface card in the system or a Remote Carrier Interface card in the Remote IPE module or cabinet.

Removing and replacing a Local Carrier Interface card

- 1 Disable the Local Carrier Interface card by logging into the system terminal, loading the Network and Peripheral Equipment Diagnostic Program LD 32, and executing **DISL sl**, where **sl** is the actual loop number of the Local Carrier Interface card.
- 2 Set the ENB/DIS switch to DIS.
- 3 Disconnect the cable from the Local Carrier Interface card faceplate.
- 4 Unlatch the card locking devices by squeezing the tabs and pulling the locking devices away from the card.
- 5 Pull the card out of the network module and place it into an antistatic bag away from the work area.
- 6 Set the replacement card ENB/DIS switch to DIS.
- 7 Hold the replacement card by the card locking devices and insert it partially into the card guides in the module.
- 8 Pull the upper and lower locking devices away from the faceplate on the card and insert the card firmly into the backplane connector. Press the card locking devices firmly against the faceplate to latch the card inside the module.
- 9 Upon insertion, the Local Carrier Interface card automatically starts the self-test.
- 10 Observe the red LED on the front panel during self-test. If it flashes three times and stays on, it has passed the test. Go to step 11. If it does not flash three times and then stays on, it has failed the test. Pull the card partially out of the module and reinsert it firmly into the module. If the problem persists, troubleshoot or replace the Local Carrier Interface card.
- 11 Connect the cable to the Local Carrier Interface card faceplate connector.

- 12 Set the ENB/DIS switch to ENL. If the uppermost red LED on the Local Carrier Interface card faceplate turns off, the card is functioning correctly and is enabled. The outcome of the self-test will be indicated on the system terminal or TTY (or the MMI terminal connected to the SDI/System Monitor connector on the Local Carrier Interface card faceplate). If the LED stays on, go to [“Isolating and correcting faults” on page 181](#) in this chapter.
- 13 Tag the defective cards with a description of the problem and prepare them for shipment to your equipment supplier’s repair depot.

Removing and replacing a Remote Carrier Interface card

- 1 Log in on the maintenance terminal as described in [“Using system maintenance programs” on page 178](#).
- 2 At the > prompt, type **LD 32** and press the Enter key to access the program.
- 3 Type **DSXP x**, where **x** is the Remote Carrier Interface card number, and press the Enter key to disable the card. The Remote Carrier Interface card is now disabled and you can remove it.
- 4 Unlatch the card locking devices by squeezing the tabs and pulling them away from the card.
- 5 Pull the card out of the IPE module or cabinet and place it into an antistatic bag away from the work area.
- 6 Hold the replacement card by the card locking devices and insert it partially into the card guides in the module.
- 7 Pull the upper and lower locking devices away from the faceplate on the card and insert the card firmly into the backplane connector. Press the card locking devices firmly against the faceplate to latch the card inside the module. The Remote Carrier Interface card automatically starts the self-test.
- 8 Observe the red LED on the front panel during the self-test. If it flashes three times and stays on, it has passed the test. Go to step 9. If it does not flash three times and then stays on, it has failed the test. Pull the card partially out of the module and reinsert it firmly into the module. If the problem persists, troubleshoot or replace the Remote Carrier Interface card.

- 9 At the . prompt in the LD 32 program, type **ENXP x (v)**, where **x** is the Remote Carrier Interface card number and **v** is the loadware version that can be optionally downloaded after the enabling process, and press the Enter key to enable the card. If the uppermost red LED on the Remote Carrier Interface card faceplate turns off, the card is functioning correctly and is enabled. The outcome of the self-test will be indicated by LD 32 on the MMI terminal connected to the Remote Carrier Interface card. If the LED stays on, go to [“Isolating and correcting faults” on page 181](#) in this chapter or replace the card.
- 10 Tag the defective cards with a description of the problem and prepare them for shipment to your equipment supplier’s repair depot.

Reinstalling covers

When you determine that the Carrier Remote IPE is operating correctly, do the following:

- 1 Reinstall covers on the system module.
- 2 Reinstall the cover on the Remote IPE floor-standing module or the wall-mounted (or pedestal-mounted) Carrier Remote IPE cabinet.
- 3 Terminate your session with the system by logging out on your maintenance terminal by typing **LOGO** at the . prompt and pressing the Enter key. If using the MMI terminal, log out to complete the test and troubleshooting session.

Packing and shipping defective cards

To ship a defective card to a Northern Telecom repair center, you should:

- 1 Tag the defective card with the description of the problem.
- 2 Package the defective card for shipment using the packing material from the replacement card. Place the card in an antistatic bag, into the box, and securely close the box with tape.
- 3 Obtain shipping and cost information from Northern Telecom and mail the package to an authorized repair center.